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ABSTRACT

A plan was developed to assure equivalency of clinical education among the medical laboratory technician (MLT) programs affiliated with Sandhills Community College. The plan was designed by faculty to monitor the quality of clinical courses offered by the clinical affiliates. The major strategies were to develop competencies, slide/tape modules, a clinical simulation laboratory on campus, a short clinic rotation for all students, and workshops for clinical adjunct faculty. Evaluation of the project was based on interviews, questionnaire results, clinical grades, and statistical studies of the effectiveness of the modules and competencies. The evaluation was conducted using a multiple regression prediction of graduates' success on the national certifying examinations. Internal and external evaluations revealed that competencies, modules, and other project features contributed to improving clinical performance and assured equivalency of clinical education among affiliates. The project demonstrated that MLT programs need not be located in metropolitan areas, if innovative plans are developed to integrate didactic and clinical competencies and if adjunct faculty are prepared for clinical teaching. (Author/SW)

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ASSURING QUALITY CONTROL OF CLINICAL EDUCATION IN MULTIPLE CLINICAL AFFILIATES

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North Carolina's first medical laboratory technician (MLT) program was begun in 1972 with five clinical affiliates, which increased to nine by 1978, thereby increasing the difficulty of coordinating clinical education. With varying sizes and locations of clinical affiliates, the program needed a plan to assure equivalency of clinical education. With assistance from a grant, the faculty designed a plan to monitor the quality control of clinical courses. The major strategies were to develop 1)competencies for use in all affiliates, 2)slide/tape modules for all affiliates, 3)a clinical simulation laboratory on campus, 4)a short clinic rotation for all students, and 5)workshops for clinical adjunct faculty. Evaluation of the project was based on interviews, results of questionnaires, clinical grades, and statistical studies of the effectiveness of the modules and competencies. Overall evaluation was conducted with a multiple regression prediction of success on the national certifying examinations after graduates had access to all the benefits of the project. Competencies, modules, and other aspects of the project contributed to improving clinical performance and assured equivalency of clinical education among affiliates. Internal and external evaluators assessed the results of the project. The project demonstrated that MLT programs need not be located in metropolitan areas, if innovative plans are developed to integrate didactic and clinical competencies and if adjunct faculty are prepared for clinical teaching.

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INTRODUCTION

North Carolina's first medical laboratory technician (MLT) program was established in 1971-72 at Sandhills Community College near Pinehurst.[10] The establishment of the Health Professions Education Assistance Act of 1963 (PL 89-129) partially encouraged Sandhills and other community colleges to begin new programs to educate associate-degree MLTs.[9] With the program well established, the faculty evaluated the program's success. A review of literature showed some MLT programs had been evaluated but few long-term studies had been located.[15] A detailed history of the development of MLT programs has been discussed in other literature,[10,12] and only a few points are relevant here. Due to PL-89-129, these new programs were established in colleges instead of hospitals. MLT programs began in the late 1960s.[12,13] The Board of Registry of the American Society of Clinical Pathologists (ASCP) recognized the associate degree clinical laboratory practitioner in 1970 by adding a Registry Examination for persons completing the Associate Degree programs.[7]

Another reason for the development of these programs was Medicare/Medicaid Legislation.[22] To carry out the provisions of this legislation, manpower projections demanded the necessity for more efficient education for technicians.[16] To assist public community colleges in developing programs, federal funds were allocated for educating allied health workers.[12] Educators had predicted that the community college would play a major role in training allied health workers in the late 1960s.[4] The Allied Health Professions Personnel Training Act of 1966 and 1968 was designed to increase the opportunity for preparing allied health workers by increasing the quality of education and training in colleges.[15]

According to the American Medical Association's (AMA) annual Allied Medical Education Directory, 754 medical technologist (MT), one MLT, and 192 certified laboratory assistant (CLA) programs had been approved by July, 1972.[1]

By July, 1973, the AMA had approved 715 MT, 14 MLT, and 182 CLA programs.[2] Fewer MT programs were initiated after 1975 while the number of MLT programs increased to 189 in 1982. In 1982, 639 MT and 73 CLA programs were also approved.[3]

When the Registry (of ASCP) offered its first certifying examination for the MLT level in 1970, brief guidelines for requirements to be included in associate degree programs were suggested. In 1974 ASCP's Board of Schools, which had recommended accreditation of programs, was reorganized as an autonomous accrediting agency with members from both ASCP and The American Society for Medical Technology. This new agency (NAACLS), National Accrediting Agency for Clinical Laboratory Sciences, set standards for MLT programs.[6] One of the standards (termed "Essentials") concerned clinical affiliates. A common practice of MT programs had been that MT education was offered by hospitals, which had academic affiliates providing students and providing the degree.[10] The practice for MLT programs was reversed. Each program was sponsored by a college which, in turn, had clinical affiliates. Most MLT programs had several clinical affiliates since the programs were not always located near large metropolitan hospitals.[1]

The Sandhills program was first approved by NAACLS(and the AMA) for 15 students.[14] These 15 students had their clinical practicum rotations at one of five clinical affiliates. Figure 1 shows the geographic distribution of the affiliates. Table 1 shows the specifications for each hospital. Assurance of equivalency of clinical training and "quality control" was attempted by having all second-year students (those in clinical rotations) sit for the same weekly clinical quizzes on campus. The program director distributed checklists of tasks to each student and each clinical instructor. Much of the program director's time was spent driving around to visit students in clinical affiliates which ranged in radius from the college four to eighty miles. Vague clinical evaluation forms were sent to clinical instructors to complete following a student's rotation.

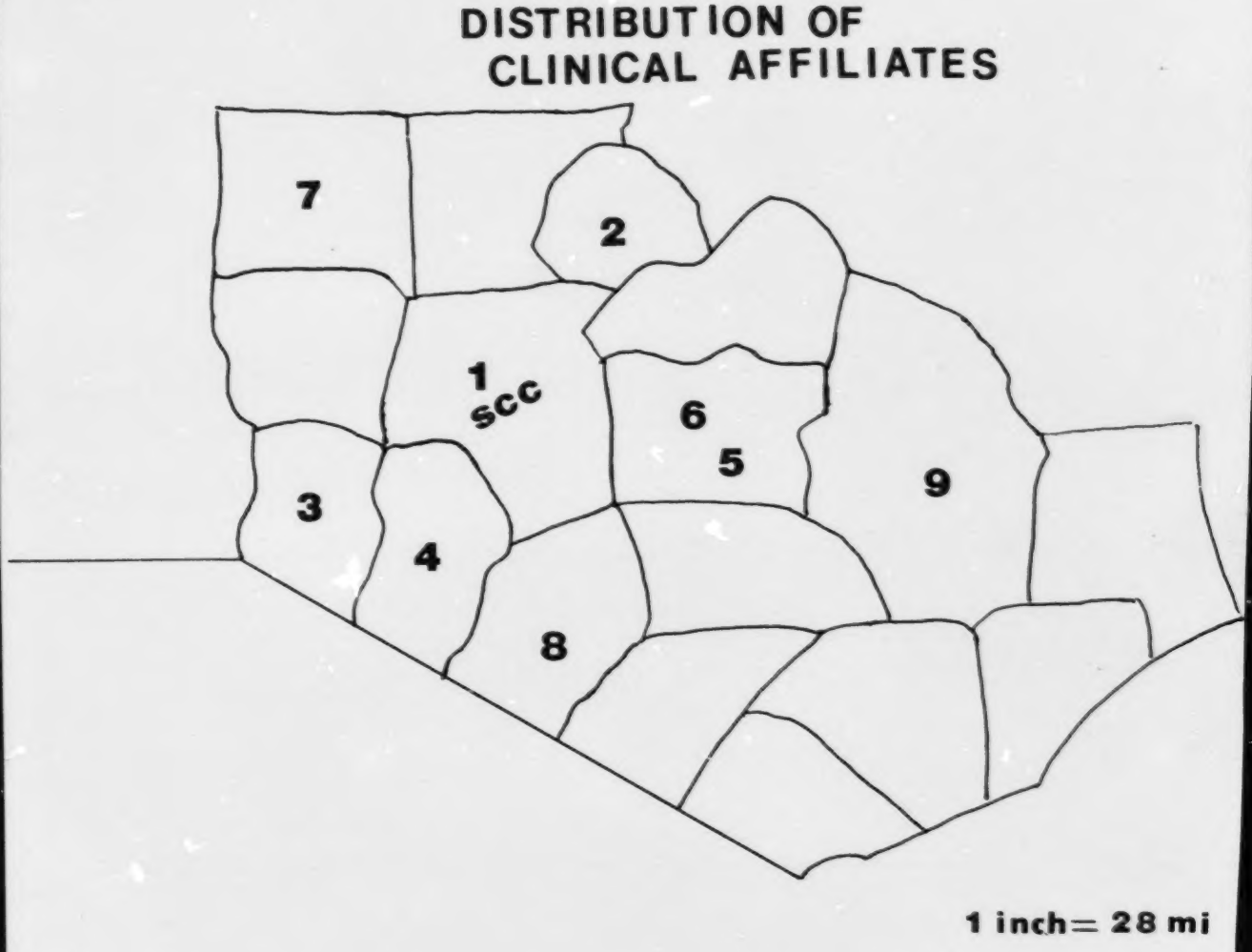
DISTRIBUTION OF
CLINICAL AFFILIATES
7
2
1
SCC
6
5
9
3
4
8
1 inch= 28 mi

Figure 1

TABLE I

SPECIFICATIONS OF CLINICAL AFFILIATES

HOSPITAL	d/mi^{o}	Beds	Techs$^{\simeq}$
1. Moore	4	340	6
2. Lee	24	140	6
3. Richmond	34	120	4
4. Scotland	35	150	6
5. Fay-VA	42	350	12
6. Womack Army	35	350	8
7. Randolph	50	150	6
8. Southeastern	55	350	7
9. Sampson	80	125	5

$^{\simeq}$ BS level
^{o} distance from campus

By 1978, the need for more clinical affiliates and the willingness of hospitals to cooperate culminated in the addition of four affiliates which ranged in distance from the college from 35 to 55 miles (Figure 1).

When 20-25 students were placed in nine clinical affiliates, the guarantee of equivalency of training was slipping. Students still came to campus one day per week to attend lecture and to take clinical quizzes, but several problems arose. First, all students could not attend lecture in the subject of their clinical rotation practicum. Second, only two lecture courses were offered on campus each quarter, (i.e., Fall quarter = hematology and chemistry). Third, students could be placed only one-at-a-time in clinical departments, and therefore, could be taking didactic courses different from clinical courses (i.e., Fall quarter, hematology lecture, immunohematology practicum) during the same quarter.

MATERIALS AND METHODS

Since the college was only 15 years old, it was eligible for a "Strengthening Developing Institutions Program" grant under Title III, Higher Education Act, 1965, PL-89-329, as amended,[8] of the then Department of Health, Education and Welfare. Several problems in offering quality clinical education in the multiple clinical affiliates of the Sandhills MLT program were addressed with the resources of the grant. Specific grant activities, which were designed for improving clinical education and for insuring its quality, were developed by the three MLT faculty members. The objectives were to:

First, develop specific competencies instead of checklists in each of the four major clinical areas.

Second, develop and produce learning modules, in the form of slide/tape programs, and distribute a copy of each program with appropriate hardware to each of nine affiliates. These learning modules were planned to supplement lecture

and to provide theory and information to those who were enrolled in different practicum and didactic courses. The faculty planned three modules for each of the four primary departments of most hospital laboratories (hematology, blood bank, chemistry, microbiology).

Third, develop an on-campus clinical simulation laboratory for students enrolled in clinical rotations.

Fourth, develop a "common" rotation for all second-year MLT students. Since each student completed all his/her clinical rotations in one hospital, students did not rotate among hospitals. The common clinic rotation was planned to provide one affiliate through which all students could rotate, if only for a short period of time.

Fifth, provide workshops on effective clinical teaching and evaluation for all clinical adjunct instructors in each of the nine affiliates.

Competencies- Specific competencies for each clinical area were written by faculty members. Several steps were taken to produce the competencies: First, the faculty visited each clinical affiliate and reviewed procedure manuals. The principles of the procedures common to all affiliates were used as one basis for developing common competencies. Faculty members discussed the development of competencies with clinical adjunct instructors. Second, the faculty used ASMT's "Statements of Competence" as a guide.[5] Third, tasks already identified in an earlier study [10] were correlated with both the "Statements of Competence" and the proposed competencies. Fourth, each competence item was coded by the objective number for both the clinical rotation and the didactic syllabi. Following their development, an outside grant evaluator also reviewed the competencies. Following their approval, the competencies were distributed to all clinical adjunct instructors, the chief technologist in each of the nine affiliates, each campus MLT faculty member, and each student. Clinical evaluation forms and new weekly clinical quizzes were written to correlate with the competencies.

The evaluation tools for the effectiveness of the use of the competencies included 1) the completion of the "evaluation of Clinical Rotations" form by students, 2) testing for the increase in grades for clinical weekly quizzes for the class which had the competencies, 3) completion of a five-point rating scale form by clinical adjunct instructors to determine their satisfaction with the clinical performance of students who had access to the competencies (Class of 1981) and those who did not (Class of 1980), and 4) evaluation by the external evaluator.

The project coordinator predicted that the class which had access to the competencies would rate the clinical rotation 0.5 (in a five-point rating scale) higher than the class which did not have access to the materials.

Slide/Tape Modules- Three self-instructional learning modules, in the form of slide tape programs, were developed for each of four program areas during 1980-82. Each of the three faculty members was responsible for one program area plus one of the modules in clinical chemistry. After the modules for hematology and immunohematology were produced, the faculty distributed copies and a Caramate® to each clinical affiliate. Faculty members consulted graduates, employers, and clinical adjunct instructors for suggested topics. Faculty members developed the "story board" for each module and then assisted the graphic arts staff member at the college in the actual production. The grant allowed two years for completion of the modules. The hematology modules concerned erythrocyte morphology, a simulated normal differential, and a simulated differential from a patient with infectious mononucleosis. The immunohematology topics included the Fisher-Race and Wiener Nomenclature, drawing a blood donor, and blood components. The microbiology topics were basic colony identification, identification of beta streptococci, and use of the microscope. The chemistry modules were safety, flame photometers, and pH meter.

Evaluation of the effectiveness of the modules was obtained by 1) assessing clinical weekly quiz scores for those students who used the modules, and a) had lecture and clinical topics concurrently, and for those students who b) had separate lecture and clinical topics; 2) having students complete the "evaluation of clinical rotations" form; 3) having clinical adjunct instructors evaluate students who had access to the modules and those who did not, and 4) obtaining feedback from the external evaluator.

Simulation Lab- The grant provided funds for the college's improving the on-campus laboratory equipment in order to provide a laboratory which could simulate one in a small hospital. First-year students in the Sandhills MLT program had skills laboratories on campus, one day per week in the MLT courses. Following the first three academic quarters, rising sophomores entered clinical rotations, which were scheduled four days per week. Students attended lecture courses on campus one day per week. In an attempt to provide some common clinical learning situations, the hematology instructor suggested having second-year students spend two full "clinical weeks" in the campus laboratory instead of the clinical affiliate. The students would be exposed to methods not practiced at all affiliates (i.e., cytochemical staining), and all the students would have the same instructor who taught all of them in the same manner. The campus faculty selected equipment items and purchased them with the grant funds. The first simulation lab to be completed was hematology. Following receipt of necessary equipment and supplies, the hematology instructor wrote a procedure manual for the laboratory; students who were enrolled in hematology clinical rotation attended the clinical simulation lab for two weeks. Following completion of the simulation laboratory experience, students completed a five-point rating scale, "Evaluation of Clinical Simulation Lab," to determine satisfaction with the lab as it related to the corresponding clinical rotation. Students' grades on clinical weekly quizzes were also tabulated. The

simulation lab and procedure manuals for the remaining topic areas were subsequently developed. The faculty considered an average rating of 0.5 point higher than the pilot rating, done in August, 1980, to be successful.

Common Clinic Rotation- Since several students in each class had obtained employment in doctors' offices or clinics, the faculty decided that each student should rotate for two weeks through the same affiliate, a clinic. An agreement was facilitated between the college and the family practice clinic (lab) of the Fayetteville Area Health Education Center (AHEC). The AHEC clinic was located almost equidistant from each clinical affiliate. The specific competencies students should learn were developed cooperatively by the MLT program director, grant external evaluator, and the chief technologist of the clinic. The competencies emphasized out-patient contact, working relationships with physicians and nurses, budgeting for a clinic (cost of tests, purchasing, inventory), and performing certain clinic procedures (i.e., CBC, cultures, urinalysis). Besides attempting to prepare each student for a clinic position, the clinic rotation was designed so that all students could learn certain procedures from the same clinical instructor at one affiliate. Faculty members evaluated the efficacy of the clinic rotation by 1) interviewing the clinic instructor and 2) tabulating student responses to the "Evaluation of FAHEC Clinic" form. Two students were assigned to the clinic during each two-week rotation until all students in the classes of 1980, 1981 had rotated through the clinic. The faculty projected that an average rating of 2.5/5.0 on the "evaluation of FAHEC clinic" form would be acceptable.

Workshops- The grant monies allowed the campus faculty to provide two workshops for the clinical adjunct instructors. The campus faculty coordinated, publicized, and implemented the workshops. Topics for the workshops were selected from among a group of topics chosen by the clinical faculty, who suggested clinical evaluation of students, management and teaching, use of audio-visual aids, use of

clinical simulation in teaching, effective clinical teaching, time management, and advising students.

The first all-day workshop was held on campus in 1980. A well-known speaker from the University of North Carolina provided the workshop on effective clinical teaching. The second workshop was held at a conference center near Chapel Hill, North Carolina in 1981. The overnight workshop included sessions on time management, effective clinical teaching, and clinical evaluation. The campus faculty served as resource leaders. The retreat atmosphere was planned to facilitate interaction among clinical instructors from the several affiliates.

Workshop participants completed a rating scale to determine the effectiveness of the workshops. The campus faculty considered a mean of 3.0 to be successful. Subsequently, clinical instructors rated students in their departments with the newly designed evaluation forms distributed at the workshop.

ANALYSIS OF RESULTS

Competencies and Modules- Rating scales completed by students and clinical instructors, quiz scores for students who had access to the modules and competencies and for those who did not, the feedback from the internal and external evaluators were methods for evaluating the effectiveness of the competencies and modules.

The students who did not have access to the competencies and modules (class of 1980) rated those clinical rotations (during which their lecture and clinical courses were different) lower ($\bar{x}$=3.30/5.00) than the students (class of 1981) who had access to the modules and competencies and whose clinical and lecture courses also varied ($\bar{x}$=3.77/5.00). The project coordinator had projected that an increase of 0.5 would be considered adequate for stating the materials had been effective. The students actually showed an increase of only 0.47, which, although not as significant, was satisfactory for the evaluators as determined by interviewing students and clinical faculty. In addition to the students' rating of the clinical rotation, the clinical faculty rated the students during the clinical rotations.

These ratings, along with those of the students are shown in Figure 2. While the mean ratings for the classes did not show an increase of 0.5, certain moderating variables such as admissions test scores and grade point average, were not held constant for the two classes. The class of 1980, which did not have access to the materials, was a better class academically than the class of 1981. The rating scale designed to evaluate this phase of the grant did not account for the differences. General feedback from the clinical adjunct instructors and students was, however, positive, concerning use of the materials. The rating of 4.31 was the same for both classes for the students not having lecture and clinical rotations together. The class of 1981 scored only 0.10 lower than the class of 1980 on the national certifying examination. One could predict, though not statistically, that the class of 1981, whose academic aptitude was lower (see CGP score in Table II) would have rated much lower on the certifying examination without the availability of the modules and competencies.

Weekly clinical quizzes were administered to all students who were enrolled in clinical rotations. Students spent one day per week on campus attending lecture and taking quizzes. Some students were enrolled in one clinical rotation, but had a different topic for the lecture course. During the one day on campus a typical student would take a quiz in the lecture subject and a different one for the clinical rotation. Students from all affiliates sat for the same quizzes.

The quiz scores for students who did not have access to the modules and competencies (class of 1980) and who did not have concurrent lecture and clinical courses averaged 74% on the weekly clinical quizzes. The mean clinical quiz score for the class of 1981 in which the students had access to modules and competencies, was 73.6%. While no increase was shown by the class of 1981, the moderating variables mentioned above were not revealed in the raw quiz scores. The mean

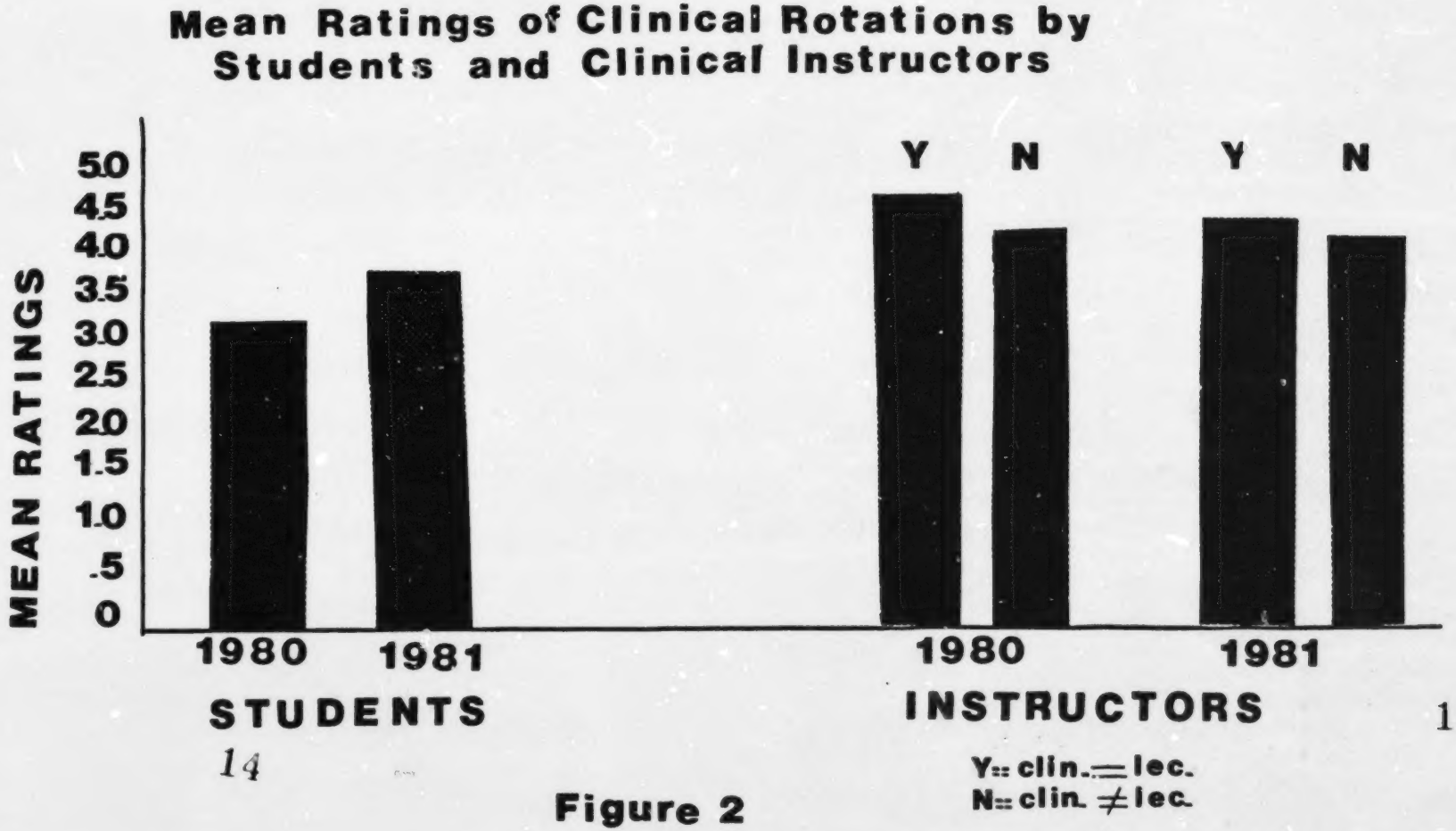
Mean Ratings of Clinical Rotations by Students and Clinical Instructors
MEAN RATINGS
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
Y
N
Y
N
1980
1981
1980
1981
STUDENTS
INSTRUCTORS
Y= clin. = lec.
N= clin. ≠ lec.

Figure 2

TABLE II

Mean Scores When Clinical≠Lecture$

Class	$\bar{x}$ Quiz*	CGP°	^certif.	▪certif.
1980	74.0	75.2	80.6	74.0
1981	73.6	59.9	73.4	73.9

*clinical
°comparative guidance & placement test
^predicted certification exam score
▪actual certif. exam score
$all scores in %

score of the admissions test, the Comparative Guidance and Placement test, was lower for the class of 1981 (see Table II). When a linear regression of placement test scores was done on the certifying examination scores for both classes, the predicted certifying exam score for the class of 1980 was 80.6%. The actual mean score was 74%. These scores, along with those for the class of 1981, are shown in Table II. From ability, one could generalize that the class of 1980 would have scored higher. The class of 1981 appeared to have scored as predicted and did as well as the class of 1980, perhaps in part, as a result of the use of modules and competencies. Figure 3 shows one of the competencies which is keyed to objectives listed by number in the didactic and clinical syliabi for hematology.

The external evaluator interviewed graduates who had used some of the modules and competencies during their clinical rotations. The students agreed that they had found the modules "very helpful."[17] The graduates also stated that the modules were being used by technologists in the clinical affiliates and all had found them "well done and very helpful."[17] Several students indicated that the modules helped them with the theory of erythrocyte morphology, blood typing nomenclature, and blood components. Practical knowledge assisting them in clinical performance was obtained from the modules on simulated differentials, safety, use of the microscope, drawing blood donors, and identifying bacteria.

Simulation Laboratories- Following completion of the procedure manual for the hematology clinical simulation laboratory in August, 1980, students were enrolled in the laboratory in the Fall, 1980. Following completion of the laboratory experience, students completed a rating scale to assess satisfaction with the experience. A mean rating of 4.74/5.00 was obtained. The mean score of the rating of the pilot labs was 3.97/5.00. Students enrolled in the blood bank simulation laboratory in the Spring, 1981. Students who were enrolled in that simulation experience rated it 4.65/5.00. The faculty had agreed that a 0.5 increase from

MEDICAL LABORATORY TECHNICIAN

COURSE NO.: MLT 221 Clinical Hematology and MLT 201

TITLE: Clinical Hematology / Hematology

CONTENT	TASK	COMPETENCY	CRITERION MEASURE
I. Erythrocytes (MLT 221, Obj. #4,5,6; MLT 201, #B-I)			
A. Counts/ Manual	Demonstrate performance of manual RBC count	Perform manual (hemocytometer) RBC counts	The manual RBC is correctly performed using a hemocytometer with 90% accuracy
B. Counts/ Automated	Demonstrate performance of automated RBC	Perform RBC count on Coulter Model S or equivalent automated cell counter (HA-5).	The RBC is correctly performed (98% correct) according to the appropriate protocol for the instrument used.
C. QC/auto	Operate, including attenuation or calibration of appropriate automated cell counter	Perform QC appropriate to the instrument and clinical affiliate for the RBC parameters	The attenuation, calibration, and QC are carried out to the clinical instructor's satisfaction
D. Erythrocyte Sedimentation Rates (ESR)	Perform ESRs	Set up and read ESRs using the Wintrobe, Zeta, or modified Westergren methods.	The ESRs are performed with proper technique and 90% accuracy.
E. Osmotic Fragility Test	Perform the Osmotic Fragility Test	Set up and read the unopette or equivalent test for osmotic fragility of erythrocytes	The osmotic fragility test is correctly performed with 90% accuracy.

Figure 3

the pilot lab would be satisfactory. The evaluations showed an increase of 0.77 from August to November, 1980, and 0.67 from August to February, 1981.

Clinic Rotation- All students attended the clinic rotation for two weeks. A five-point rating scale was developed to evaluate satisfaction with the clinic rotation. An average rating of 2.5/5.00 was considered satisfactory. The mean rating by the class of 1980 was 3.10/5.00. The class of 1981 rated the rotation 3.66/5.00. Since the ratings were higher than the minimum satisfactory rating, the rotation was considered to be successful. The chief technologist at the clinic also evaluated each student, and his overall rating of the students was good. The external evaluator also considered the rotation to be beneficial.

Workshops- Two workshops were held for clinical adjunct faculty during 1980 and 1981. The 18 instructors who attended the 1980 workshop on campus on effective clinical teaching rated the effectiveness of the workshop 4.66/5.00. The 18 who attended the 1981 workshop at the conference center rated the workshop's effectiveness as 4.32/5.00. A mean rating of 3.0/5.00 was considered satisfactory. The campus and clinical faculty agreed that the workshops helped to ameliorate problems encountered in clinical teaching and evaluation.

External evaluation- The external evaluator sent two summary reports of her impression of the success of the grant to the project coordinator after visiting the college several times during the grant period. While her results were more descriptive than quantitative, several comments were helpful:

> ...competencies completed during the first year of the grant were written at an appropriate level and included all appropriate areas. The idea behind the modules is a really excellent one and they should be very helpful to students in their clinical rotations.[17]

Final Evaluation- The statistical evaluation of the grant's effectiveness was determined by a comparison of certifying examination results of classes which had not benefited from the grant with those which had. The mean score on the

certifying examination for five classes (1976-1980) was 67.6%. The mean score for the class of 1981 was 73.9%. The mean score for the class of 1980 was 74%. The discrepancy was accounted for by the fact that the class of 1980 had a lower mean score on the admission test than the class of 1981 (see Table II). Considering these basic differences, the certifying examination scores were considered to be satisfactory. When the admissions test score, average clinical quiz scores, and clinical evaluation ratings of students were entered into a multiple regression formula, the correlation of predictor variables with the certifying examination score was 0.19 for the class of 1980, and 0.84 for the class of 1981. While the correlation of clinical grades and clinical performance was more predictive of success for the class of 1981, the class of 1980 was inherently more intelligent (according to aptitude).

DISCUSSION

In her final report to the college, the external evaluator indicated that:

> ...there is no question that the various activities made possible by this grant have been extremely beneficial to the educational program. The slide/tape programs especially should continue to benefit the classes for many years to come because the topics covered are very basic and shouldn't change too rapidly. The on-campus simulation laboratory has greatly broadened the scope of the clinical course... This grant has definitely met its objectives and has indeed strengthened this program.[17]

Other than external evaluation, internal evaluation consisted of assessing 1)weekly quiz scores for students enrolled in different lecture and clinical courses, 2)students' satisfaction with clinical rotations, 3)instructors' ratings of students in clinical rotations, 4)students' ratings of the clinical simulation laboratories, 5)students' and instructors' ratings of the clinic rotation, and 6)clinical instructors' ratings of the clinical teaching workshops. The overall effectiveness of the grant was measured by the report from the external evaluator, by changes in rating scores for students who had access to

the benefits of the grant, and by the measure of predicted certification scores based on the use of admissions test scores, mean clinical quiz grades, and clinical evaluation ratings as independent variables.

Quiz score results were approximately equal for both classes even though the class of 1980 was considered to be more intelligent. Predicted certifying examination scores were higher than actually achieved for the class of 1980 and were predicted as achieved for the class of 1981.

The rating scale for student satisfaction with clinical courses showed a slight increase for the class of 1981 which had access to the modules, simulation laboratories, and competencies.

The clinical adjunct instructors determined their satisfaction with the clinical performance of students who had used the modules, competencies, and simulation laboratories. While the mean evaluations did not improve for students who used the materials, the moderating variables were not held constant by the rating scales used.

The mean responses of students who used the clinical simulation laboratories showed satisfactory improvement.

The students were satisfied with clinic rotations as shown by the mean evaluation scores.

Two successful workshops were held for clinical adjunct instructors during the grant period.

CONCLUSIONS

The grant enabled the faculty to improve the campus laboratory and to offer laboratories on campus to students enrolled in clinical rotations. The slide/tape modules and competencies, once distributed to clinical affiliates, allowed greater equivalency of clinical education. Use of the various evaluation instruments for assessing the effectiveness of the grant led the faculty,

internal evaluator, and external evaluator to conclude that the modules and competencies had improved clinical performance of students and had assured greater "quality control" of clinical rotations. By using competencies, modules, common rotations (i.e., the clinic), simulation laboratories, and workshops for clinical faculty, a small number of MLT faculty members in a rural community college with multiple clinical affiliates could provide quality clinical and didactic education for their students.

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